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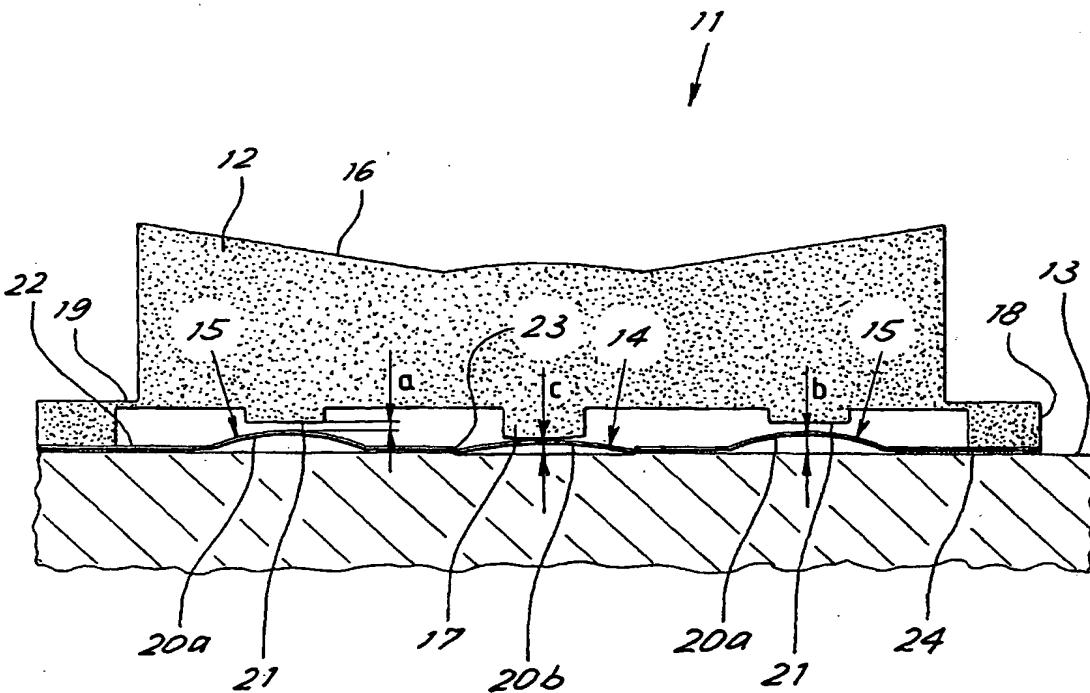
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*[Continued on next page]*

(54) Title: CELLULAR TELEPHONE NAVIGATION CONTROL



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(57) Abstract: A cellular telephone control of the navigator key type comprises a button (12) tiltable in four directions essentially arranged in a cross for alternative operation of one of four switches (15). The control comprises a fifth switch (14) operated by downward pressure of the button. Advantageously the fifth switch (14) also provides a hinging surface for tilting of the button (12) in the four directions.



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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

"Cellular telephone navigation control"

The present invention relates to a cellular telephone navigation control. In cellular telephone technology, controls termed 'navigator keys' having the form of a large button generally round in shape and tilttable in four directions arranged in a cross are known. Tilting of the button in each of the four provided directions closes a corresponding electrical contact. The button therefore provides a four-way key, i.e. having four electrical contacts that can be operated alternatively by appropriate tilting of the button. This operation is easy to perform with a single finger.

The term 'navigator key' is derived from the fact that this type of control is often used for 'navigation', i.e. moving within selection menus available in the cellular telephone. Although operation with a single finger was found very advantageous, known navigator keys still require use of at least one other key, e.g. to confirm the choice made in the menus using the navigator key.

This involves the necessity for the user to move the finger continually from the navigator key to another key, thus complicating use of the equipment and reducing the immediacy of the operation.

The general purpose of the present invention is to remedy the above mentioned shortcomings by making available a navigator key with increased convenience.

In view of this purpose it was sought to provide in accordance with the present invention a cellular telephone

control of the navigator key type comprising a button  
tiltable in the four directions essentially arranged in a  
cross for alternative operation of one of four switches  
characterized in that it comprises a fifth switch operated  
5 by downward pressure of the button.

To clarify the explanation of the innovative principles of  
the present invention and its advantages compared with the  
prior art there is described below with the aid of the  
annexed drawings a possible embodiment thereof by way of  
10 non-limiting example applying said principles. In the  
drawings:

- FIG 1 shows a diagrammatic view of a cellular telephone  
equipped with a control provided in accordance with the  
present invention,
- 15 - FIG 2 shows a diagrammatic plan view of a part of the  
control of FIG 1, and
- FIG 3 shows a cross-section view of the control along  
plane of cut III-III of FIG 2.

With reference to the figures, FIG 1 shows diagrammatically  
20 a cellular telephone indicated as a whole by reference  
number 10 equipped with a control 11 of the navigator key  
type. The control 11 comprises a button 12 which is  
tiltable in the four directions arranged essentially in a  
cross to operate alternatively one of four switches. In  
25 FIG 1 the four directions are indicated by arrows along the  
edge of the button. In accordance with the present  
invention, in addition to this the control 11 comprises a  
fifth switch which can be operated by pressing the button  
downward.

The control is advantageously mounted on a printed circuit junction block 13 which can support other parts of the internal circuitry of the telephone.

As may be seen in FIG 2 where the control is removed from  
5 the cover and with the external button removed the fifth  
switch 14 is arranged in the center of the cross formed by  
the other four switches 15.

FIG 3 shows the advantageous structure of the control 11.  
As may be seen in this FIG the button 12 has a central pin  
10 17 resting on the central switch 14. This way the switch  
14 provides the hinging support for tilting of the button  
in the four directions of operation of the peripheral  
switches 15. The key has its upper surface 16 concave to  
facilitate operation with a single finger. Operation of  
15 the control as a navigator key is essentially like that of  
the know type with the operating button hinged on the  
central switch. For this purpose the profile of the  
central pin 17 which rests on the central switch has to be  
rounded so that it allows rotation on the surface of the  
20 switch.

To ensure stability of the control in the unoperated position the key 16 has a peripheral support crown 18 connected to the central body by means of an elastically flexible membrane 19. This membrane must have a length  
25 such as to allow the key to complete its entire travel in the peripheral part.

Advantageously the button 12 is provided in a single piece of silicon rubber or plastic of suitable pliability and possibly having a plastic cap (not shown). In the FIGS the

button is shown round but it can naturally have different shapes suited to operation of the underlying switches. For example the button could be provided in the shape of a cross as shown in broken lines at 12a in FIG 2.

5 Advantageously each switch 14, 15 comprises a domed elastic member 20a, 20b on which a corresponding operating projection 17, 21 arranged beneath the button (advantageously in one piece therewith) pushes when operated. The operating projection of the central switch  
10 is the same tilting pin 17.

Again in accordance with the preferred embodiment at least the four peripheral switches have their domed elastic members provided in a same sheet 22 of suitable plastic material, e.g. polyester, fastened to the surface of the  
15 junction block 13 in which are made appropriate electrical contact tracks. In technology this shaped plastic sheet is known as 'polydome'.

The domed switches are known and not described in further detail.

20 It was found that the operating force of the fifth switch should be advantageously at least one and a half times and, in particular, at least twice the operating force of each of the other four switches. This ensures reliable operation of the side switches without accidental operation  
25 of the central switch. In addition travel of the button 12 for operation of the fifth switch should be less than the operating travel of each of the other four switches. This prevents movement of the button for operation of the central switch from operating the side switches mistakenly.

In the device shown in FIG 3 the second condition is equivalent to the fact that the distance  $a + b$  is greater than  $c$ .

To obtain a differentiated operating force the following  
5 structure was found advantageous.

Opposite the central switch 14 the sheet 22 has a hole 23 and the domed elastic member 20b of the fifth switch is made separately and arranged to project toward the respective projection 17 beneath the button through the  
10 opening 23 in the plastic sheet. This way it is possible to provide the dome 20b with less pliability. For example it is practical to make the domed elastic member 20b of the fifth switch of metal.

To hold the sheet 22 in place, between the sheet 22 and the  
15 support surface 13 there is arranged a tape with both sides adhesive 24. This layer of tape with both sides adhesive can be a sheet with both sides adhesive appropriately windowed.

It is now clear that the predetermined purposes have been  
20 achieved. The control in accordance with the present invention can be used for navigation in menus by tilting the button to operate the peripheral switches.

Confirmation of selection or other functions can be controlled by pressing the control inward without tilting  
25 it. With a single control it is thus possible to obtain all the functions necessary for a menu selection system such as that of modern cellular telephones.

Naturally the above description of an embodiment applying the innovative principles of the present invention is given

by way of non-limiting example of said principles within the scope of the exclusive right claimed here. For example the peripheral switches could also be provided with metal elastic domes as for the central switch.

## CLAIMS

1. Cellular telephone control of the navigator key type comprising a button tilttable in the four directions
- 5 essentially arranged in a cross for alternative operation of one of four switches characterized in that it comprises a fifth switch operated by inward pressure of the button.
2. Control in accordance with claim 1 characterized in that the fifth switch is arranged in the center of the cross
- 10 formed by the other four switches and also provides hinging support for tilting of the buttons in said four directions.
3. Control in accordance with claim 1 characterized in that the operating force of the fifth switch is at least one and one half times and in particular at least twice the
- 15 operating force of each of the other four switches.
4. Control in accordance with claim 1 characterized in that the travel of the button for operation of the fifth switch is less than the operating travel of each of the other four switches.
- 20 5. Control in accordance with claim 1 characterized in that each switch comprises a domed elastic member on which upon operation it pushes an operating projection arranged beneath said button.
6. Control in accordance with claim 5 characterized in that
- 25 at least the said four switches have domed elastic members provided in one and the same plastic sheet placed on a surface providing support and electrical contact for the switches.
7. Control in accordance with claim 6 characterized in that

the domed elastic member of the fifth switch is arranged to project towards the respective projection beneath the button through an opening in said plastic sheet.

8. Control in accordance with claim 7 characterized in that  
5 the domed elastic member of the fifth switch is of metal.-
9. Control in accordance with claim 7 characterized in that between the plastic sheet and the support surface is arranged a both-sides-adhesive layer for mutual fastening between the plastic sheet and the support surface.
10. Control in accordance with claim 7 characterized in that the button is made in the form of a cross with each arm operating one of said four switches.

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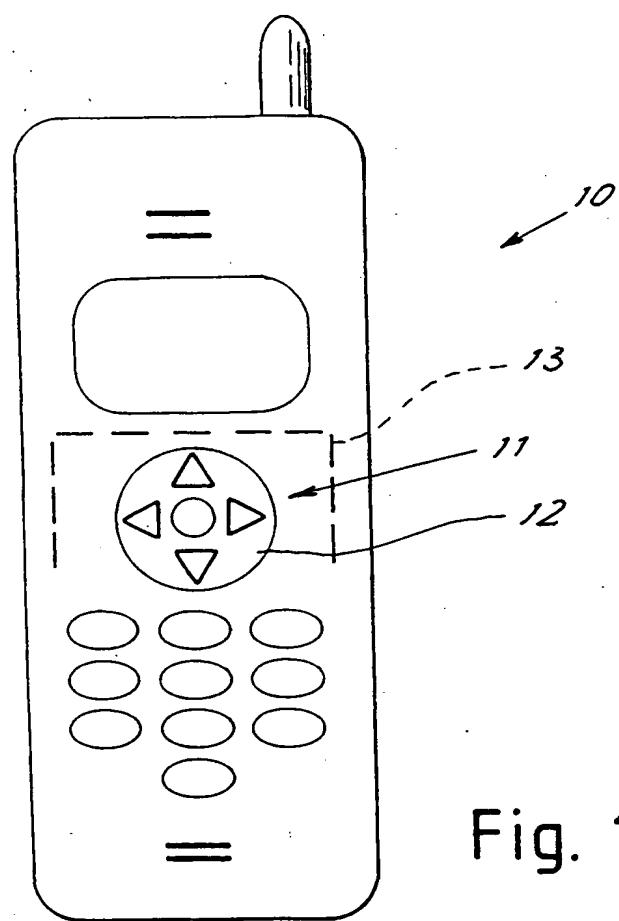


Fig. 1

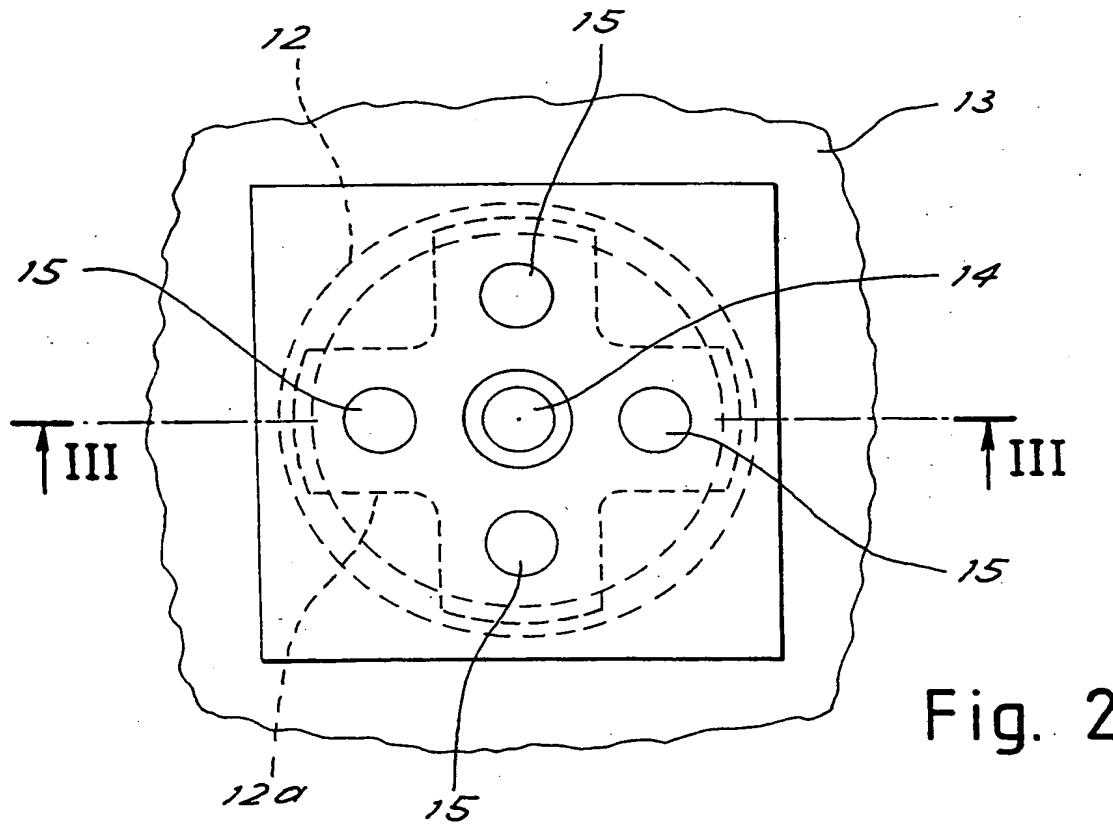


Fig. 2

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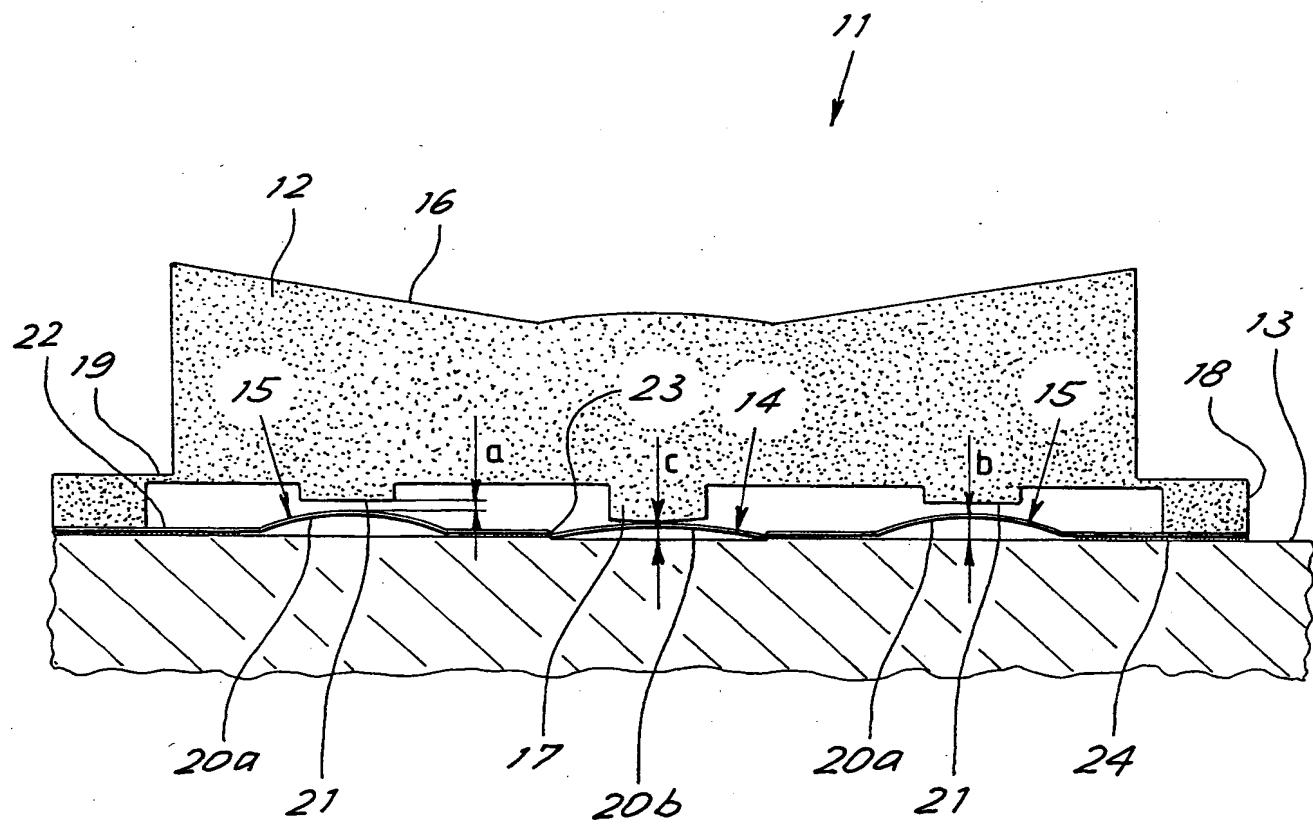


Fig. 3

# INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 H01H25/04 G06K11/18 H04M1/247

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B. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 09, 30 September 1996 (1996-09-30) -& JP 08 115641 A (MATSUSHITA ELECTRIC IND CO LTD), 7 May 1996 (1996-05-07) abstract; figures 1-9	1,2,4,5
Y	DE 198 53 438 A (HOSIDEN CORP) 17 June 1999 (1999-06-17) the whole document	3,6-10
X	DE 198 53 438 A (HOSIDEN CORP) 17 June 1999 (1999-06-17) the whole document	1,2
Y	EP 0 917 330 A (NIPPON ELECTRIC CO) 19 May 1999 (1999-05-19) column 7, line 1-46; figures 7,8A,B	6-10
X	EP 0 917 330 A (NIPPON ELECTRIC CO) 19 May 1999 (1999-05-19) column 7, line 1-46; figures 7,8A,B	1
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Patent family members are listed in annex.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 796 056 A (HAUG THOMAS ET AL) 18 August 1998 (1998-08-18) figures 1A,B,C,3-6 -----	3

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Information on patent family members

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